

OPERATION/INSTRUCTION/MAINTENANCE MANUAL

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OVEN, MODEL STG80

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## OPERATION & MAINTENANCE MANUAL

### Introduction

Your satisfaction and safety are important to Daigger Scientific and a complete understanding of this unit is necessary to attain these objectives.

As the ultimate user of this apparatus, it is your responsibility to understand its proper function and operational characteristics. This manual should be thoroughly read and all operators given adequate training before attempting to place this unit in service. Awareness of the stated cautions and warnings, and compliance with recommended operating parameters are important for safe and satisfactory operation. The unit should be used for its intended application; alterations or modifications will void the Warranty.

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**WARNING:** As a routine laboratory precaution, always wear safety glasses when working with this apparatus.

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This product is not intended, nor can it be used, as a sterile or patient connected device. In addition, this apparatus is not designed for use in Class I, II, or III locations as defined by the National Electrical Code.

### Unpacking and Damage

Save all packing material if apparatus is received damaged. This merchandise was carefully packed and thoroughly inspected before leaving the factory.

Responsibility for its safe delivery was assumed by the carrier upon acceptance of the shipment; therefore, claims for loss or damage sustained in transit must be made upon the carrier by the recipient as follows:

Visible Loss or Damage: Note any external evidence of loss or damage on the freight bill, or express receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusing to honor your damage claim. The form will be supplied by the carrier.

Concealed Loss or Damage : Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked and inspected. Should either occur, make a written request for inspection by the carrier's

agent within 15 days of the delivery date; then file a claim with the carrier since the damage is the carrier's responsibility.

By following these instructions carefully, we our full support of your claim to be compensated for loss from concealed damage.

DO NOT -- FOR ANY REASON -- RETURN THIS UNIT WITHOUT FIRST OBTAINING AUTHORIZATION. In any correspondence to DAIGGER SCIENTIFIC please supply the nameplate data, including catalog number and serial number.

### General Information

This manual encompasses the following model and its specific electrical characteristics.

Model STG 80 employs gravity convection as a method of heat transfer within its chamber. Gravity convection is defined as the natural tendency for heated air to rise due to its change in density and mass.

Air is drawn into the chamber through openings in the bottom of the oven then heated as it passes over the heating coils and up through the openings in the diffuser panel located on the bottom of the chamber. A limited amount of the heated air is exhausted out of the chamber through the openings in the vent cap located on top of the oven and the remaining air recirculates within the chamber.

Gravity convection ovens are ideal where forced air circulation cannot be tolerated and for situations demanding gentle curing, or for long term sample storage under closely controlled conditions.

Some gravity convection applications are: drying powders, curing of facial cosmetic prosthetics, preparation of soil samples, semi-conductor aging, and drying materials for chemical analysis.

The Model STG gravity convection oven uses two highly accurate hydraulic thermostats -- one control and one safety high limit. This provides a sensitivity to  $\pm 0.25$  C.

No other equipment other than what is supplied is required to operate this oven.

Table 1A

<u>Technical Specifications</u>		
Model	:	STG80
Heat Transfer Method:		Gravity
Temperature		
Min. C	:	65
Max. C	:	225
Time to Reach Max. rated C in minutes:		60
Guaranteed Temp uniformity (+ C)		
100 C	:	1.3
200 C	:	1.6
Sensitivity (+ C)	:	0.25
Recovery Time to 100 C* in minutes	:	15
Maximum Air Changes per Hour	:	19
Chamber		
Dimensions wxdxh inches (cm)	:	19x14x19 (48x36x48)
Volume ft (liters):		2.9 (83)
Shelves		
# supplied	:	2
Total Area ft (m )	:	3.3 (0.31)
Exterior Dimensions		
wxdxh inches (cm)	:	24x18x32 (61x46x81)
Weight lbs	:	90
Cube ft	:	12.5

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\*Door opened for 30 seconds

Installation:

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WARNING: Installation should be completed by qualified instrument personnel ONLY.

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Location : The most uniform operating conditions and results will be obtained by placing the oven in an area remote from drafts, ventilating outlets, radiators, and other rapidly changing ambient conditions.

To assure proper ventilation, allow a minimum of 4 inches of clearance between the rear top, and sides of oven and adjacent walls. If two or more ovens are positioned side by side allow a minimum of 8 inches between cabinets. The chosen site should be as free as possible from dust to eliminate



maintenance and at the same time extend the life of the controls.

### Electrical Connections : Important (Please Read Carefully)

CAUTION: Be sure of the power supply voltage before plugging in the unit.

For 120V use:

The power cord of these instruments is equipped with a three-prong (grounding) plug which mates with a standard three-prong (grounding) wall receptacle to minimize the possibility of electric shock hazard from this apparatus. The user should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly wired.

For 240V use:

Plug the power cord from the oven into the transformer receptacle and in turn plug the transformer into the appropriate 240V power supply. The transformer is a voltage reduction device, reducing a 240v electrical source to 120V. If the male plug on the transformer will not mate with your female 240V power supply the correct female plug will need to be installed at your location before operating the oven.

WARNING : DO NOT, under any circumstance, cut or remove the third(ground) prong from the power cord. DO NOT use a two-prong adaptor plug.

### Explanation of Circuit:

The oven circuit consists of a resistance heater controlled by a thermostat and backup safety thermostat. A pilot light illuminates when power is supplied to the element.

### Explanation of Controls:

"ON - OFF" Switch: Controls all power to the oven. The blower motor on mechanical convection ovens will always be in operation when the switch is in the "ON" position.

"CONTROL" Thermostat Knob A temperature control dial is used in the selection of the desired operating temperature and a pilot light which indicates heater operation (Light "ON" - Heater "ON").

SAFETY "HIGH LIMIT" Thermostat Knob A separate adjustable high limit control turns "OFF" the heater if the selected limit is attained. A reed light will indicate this condition

when lit.

"CONTROL/SAFETY" Pilot Lamp : The left lamp (white) when "ON" indicates heater operation. The right lamp (red) when "ON" indicates the controlling thermostat has failed or is not controlling and the safety thermostat has taken control.

### Operation

Fully open the exhaust vent shutter cap on the top of the cabinet and keep it open at all times. However, when operating at maximum rated temperature, it may be necessary to turn the shutter cap towards the closed position. This will eliminate chamber heat loss.

Insert the shelf supports into holes provided in the shelf support retainers that are fastened to the side walls of the inner chamber. Insert the shelves into the shelf support and the shelves should be positioned so they can be withdrawn more than half way out without falling.

A mercury-in-glass thermometer, temperature range of 0 to 250 C, is provided and should be inserted through the hole located in the top of the vent shutter cap. The cap contains 3 tabs that may have to be bent inwards to secure the thermometer and maintain it in a vertical position.

1. Depress the "ON -OFF" switch to the "ON" position.
2. Rotate the "HI-LIMIT" thermostat knob fully clockwise.
3. Rotate the "CONTROL" thermostat knob clockwise (clockwise rotation increases chamber temperature) to an arbitrary setting.
4. Allow the chamber to heat up until steady readings are observed on the thermometer. The chamber temperature has stabilized when there is uniform sealing of the control pilot light.
5. A desired operating chamber temperature as indicated on the thermometer, and obtained at a particular thermostat control knob setting, should be recorded for future reference.

Before moving from a higher setting to a lower setting, the thermostat control knob should be turned all the way back to the "Zero" position. The new temperature setting should be approached in a clockwise direction.

6. Set the "HI-LIMIT" thermostat (which should be at its maximum setting now fully clockwise), by rotating the knob counter clockwise until the red pilot light turns "ON". It indicates that the "HI-LIMIT" thermostat

has taken control and that the heater has been de-energized. Once this occurs, turn the knob clockwise at least one division.

NOTE 1 : This adjustment for the "HI-LIMIT" thermostat should be done only when the chamber temperature is stabilized.

NOTE 2 : Slight vapor discharge may occur on the initial heat up. This is the dissipation of the protective coatings that have been added to the cabinet. Allow for complete dissipation of the vapors before placing samples in the chamber.

Loading : Although the gravity and mechanical convection ovens rely on different methods of air circulation, general loading procedures are applicable to both types and must be followed. To insure that the circulation of heated air is not restricted in the chamber.

1. At least 1" should be left between objects placed on the shelves.

Note: With the mechanical convection ovens rely on different methods of air circulation, general loading procedures are applicable to both types and must be followed. To insure that the circulation of heated air is not restricted in the chamber.

2. The bottom of the chamber must be kept free and clear of objects.
3. At no time should solid shelves be substituted for themselves that are provided.

After loading, the time required for the chamber to recover to the original stabilized temperature will be directly related to the mass of the load.

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WARNING: SAFETY PRECAUTIONS

1. DO NOT place any explosive, combustible, or flammable materials in the chamber.
2. DO NOT place sealed containers in the chamber. Sealed containers, filled with materials, do not provide room for expansion and can develop dangerous vapor pressure as the temperature increases.
3. Avoid spillage of liquids.
4. DO NOT evaporate noxious fumes.

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CAUTION : DO NOT store containers filled with acidic or



caustic solutions, as vapors from these materials will attack the chamber interior and electrical components, thus voiding the warranty.

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To stop equipment, turn switch to "OFF" position.

### Servicing

#### Troubleshooting:

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WARNING: Service should be performed by qualified service personnel. Disconnect the unit from its electrical source. Remove the shelves and thermometer, if supplied. Disconnecting any component from the circuit without prior removal of the power source may cause damage to other circuit components.

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#### Temperature Variance or Fluctuation:

1. Make sure the vent shutter cap is not closed. Open to maximum.
2. Test unit when empty; if results are satisfactory, the chamber was improperly loaded. Redistribute the load.
3. Be sure to allow ample time for an empty chamber to stabilize at a temperature setting. It could take over one hour to equilibrate, depending upon the difference between ambient and operating temperatures. The mass of the load can also affect stabilization time.
4. Make certain that severe line voltage fluctuations are not occurring.
5. Make certain that all wire terminal connections are secure.
6. Make certain that an intermittent failure of the switch, thermostat, or wiring has not occurred. Isolate the cause; repair or replace.

Heat Loss : Inspect door gasket to make certain it fits firmly against cabinet at all points. Replace if damaged, or adjust the door catch plate. (See Improper Door Closure).

Improper Door Closure : The plate on the door which engages the magnetic catch on the cabinet is adjustable. Either loosen or tighten it to ensure proper door closure.

No Heat : If the chamber does not heat, first check the line voltage, circuit breaker and/or fuses, and all electrical connections.

Heater Resistance Test Procedure:

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WARNING: Disconnect the oven from its power source.

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Refer to the appropriate wiring diagram and the Heater Data Table for resistance values at room temperature. Resistance is measured between terminals 1 and 2 located on the terminal block.

Be sure to disconnect at least one heater lead from the terminal block before taking an ohmmeter reading. If the heater is open (infinite resistance), it should be replaced.

Table 2A  
Heater Data Table

Catalog No	Model	Heater Wattage	Voltage	Resistance Between Heater Leads (ohms)
31478	STG 80	1420	120	10.0

Loss of Heat Control: If at any time the safety thermostat assumes control of the chamber temperature, replace the "CONTROL" thermostat.

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WARNING : Replacement of the following components should be completed by a qualified electronic service person, and the oven should be disconnected from its electrical power source.

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"ON - OFF" Switch Replacement :

1. Remove 4 screws that fasten the control panel to the oven to gain access to the electrical components.
2. Tag and identify the lead wires with respect to their relative positions for ease of replacement.
3. Remove the wire leads from the switch.
4. Compress the spring clips that fasten the switch outward from the back of the panel.
5. Press the replacement switch into the panel and connect

the wire leads.

Pilot Lamp Replacement :

1. Remove 4 screws that fasten the control panel to the oven to gain access to the electrical components.
2. Tag and identify the lead wire with respect to their relative positions for the ease of replacement.
3. Remove the wire leads from the pilot lamp.
4. Push the pilot lamp outward from the back of the panel.
5. Press the replacement lamp into the opening and replace speed nut, if supplied. On units with dual pilot lamps, the red portion should be on the right.
6. Attach the appropriate wire to the pilot lamp.

CONTROL or SAFETY HI-LIMIT Thermostat Replacement :

1. Remove 2 screws that fasten the thermostat bulbs and bulb retainer to the diffuser panel. Bend the thermostat capillaries towards the top of the chamber.
2. Remove 2 screws that fasten the diffuser panel brackets to the side walls. Remove the diffuser panel from the bottom chamber and carefully slide the bulbs through the hole in the diffuser panel.
3. Loosen the set screws that fasten the control knob to the shaft of the thermostat, than remove the knob.
4. Remove 4 screws that fasten the control panel to the oven to gain access to the electrical components.
5. Tag and identify the lead wires with respect to their relative positions for the case of replacement.
6. Disconnect the wire leads from the thermostat.
7. Guide the thermostat bulb out of the chamber and out through the bottom of the oven.
8. Replace the thermostat, reversing the above procedure.

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CAUTION: Do Not crimp or sharply bend the capillaries as this will obstruct the flow of the hydraulic operating media causing erroneous thermostat control and shorten the life of the thermostat. Also, be sure there is no contact between the capillaries and heater.

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### Heater Replacement :

1. Remove 2 screws that fasten both thermostat bulbs and the retaining clips to the bottom diffuser panel in the chamber.
2. Remove the bottom diffuser panel by removing its retaining screws. Work the thermostat bulbs (gravity ovens only) upright and lift the panel out of the chamber, carefully sliding the bulbs through it, while noting the hole through which the bulbs were originally placed.

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CAUTION: Do Not crimp or sharply bend thermostat capillaries as it will obstruct the flow of the hydraulic operating media causing erroneous thermostat control and shorten the life of the thermostat.

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3. Disconnect the heater from the bus bars. (Do not allow the bus bars to slip down through the porcelain insulators or it will be necessary to remove the control panel to push them back.) Lift the heater from the chamber. Install the new heater and reconnect the bus bars.
4. Work the two thermostat bulbs (gravity ovens only) through the hole in the bottom diffuser panel. Replace the panel and secure it.
5. Carefully work the bulbs back into place and secure them with the retaining clips.

### Maintenance (All Models) :

Maintenance should be effected monthly to assure reliability.

#### Cleaning Exterior and Interior:

A mild solution of soap and water or bicarbonate of soda (1 tbs/gallon of water) is recommended.

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WARNING: Disconnect the oven from its electrical power source.

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Storage: The oven should be stored indoors in a cool, dry environment, preferably at less than 90 F. If stored outdoors the unit should be sealed in an air tight & moisture proof container with desiccant. Unit should be inspected monthly for corrosion or the presence of water inside of the container. If present, the unit should be dried and repackaged.

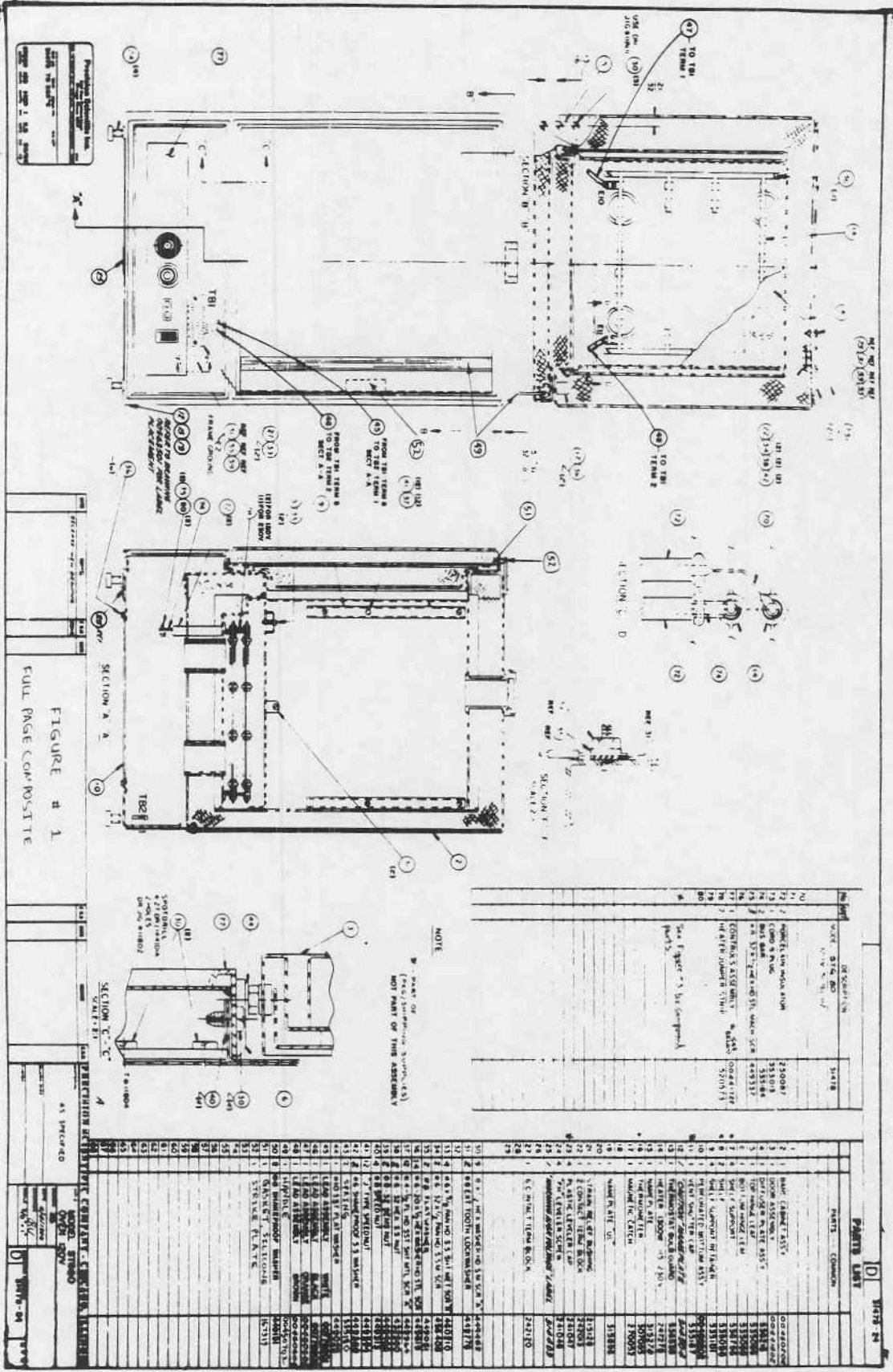


PARTS LIST

Model: STG 80 Catalog #: 31478

Wiring Symbol	Description	Part #	Fig #	Item #
	Transformer	2275275	none	none
TB1	Terminal Block, 6 position	242120	5	TB1
TB2	Terminal Block, 2 position	242013	5	TB2
W2	Wiring Harness	535208	5	W2
W3	Lead Assembly White	00770901	5	W3
W4	Lead Assembly Black	00770902	5	W4
DS3	Lamp, Dual Pilot, (White & Red)	234147	3	10
W5	Lead Assembly, orange	00460605	5	W5
HR1	Heater	247275	1	14
S1	Switch, Line	240304	3	4
S2,S4B	Thermostat, Safety Hi-Limit	239091	3	3
	Knob, Safety Therm (0-9)	220097	3	2
E12,E13	Jumper	520573	5	E12,E13
E10,E11	Busbar	535184	5	E10,E11
S4A	Thermostat Control	239091	5	S4A
	Knob, Therm (0-9)	220097	3	2
	6-32 x 3/16 screw	449832	3	5
	8 SS Washer	449879	3	6
	8-32 nut	449465	3	7
	Insulator Porcelain	250087	1	72
	Shelf (2 Supplied)	535096	1	8
	Support, Shelf, (4 supplied)	536796	1	7
	Leveller Screw (4 supplied)	241048	1	24
	Cap, Leveller (4 supplied)	241047	1	23
	Cap Shutter Vent	535187	1	11
	Thermometer	307055	1	16
	Catch, Magnetic (Mtd on cabinet)	270052	1	17
	Leaf, Top Hinge (Mtd on cabinet)	535085	1	5
	Leaf, Bottom Hinge (Mtd on cabinet)	535088	1	6
	Door Assembly	00441802	1	3
	Hinge Pin (2 req.)	535086	1	52
	Spring (2 req.)	535180	1	43
	Strike Plate	535450	1	52
	Gasket, Silicone	167319 (6.75ft)	1	51
	Handle	00450702	1	49
	Cord and Plug	353015	1	73
	Lockwasher	449776	3	8
	SS 8-32 x 1/4 screw	456504	3	9
	Panel & Frame Assembly	00452322	3	11
	Bus Bar	535184	5	E10
	Machine Screw 8-32 x 1/2	449337	1	75
	Controls Assembly	441722	1	77
	Heater Jumper Strip	520573	5	E12
	BARS Cabinet Assembly	00450202	1	2
	Door Assembly	00441802	1	3
	Diffuser Plate Assembly	535216	1	4
	Shelf Support Retainer	535101	1	9

Perf bottom assembly	00485202	1	10
"Caution" nameplate	314504	1	12
Thermostat Bulb Guard	536538	1	13
Nameplate	315278	1	15
Nameplate "UL"	315896	1	19
Strain relief bushing	215128	1	21
Label "Warning High Voltage"	314409	1	25
8x1/2 Washer	449462	1	30
Pan head 6 x 5/8 screw	460210	1	33
Pan Head 6-32 x 1/2 screw	456408	1	34
Flat Washer #8	449051	1	35
Screw, 6-20 x 1/2	449619	1	36
Screw, 4 - 1/2	449964	1	37
Nut, 6-32	432560	1	38
Nut, 8-32	449466	1	39
Nut #8	449313	1	40
Nut, Type J	449594	1	41
Washer, #6	449389	1	42
Washer, #10	449025	1	44
W6 Assembly Brown	460604	5	W6
Washer #8	449131	1	50



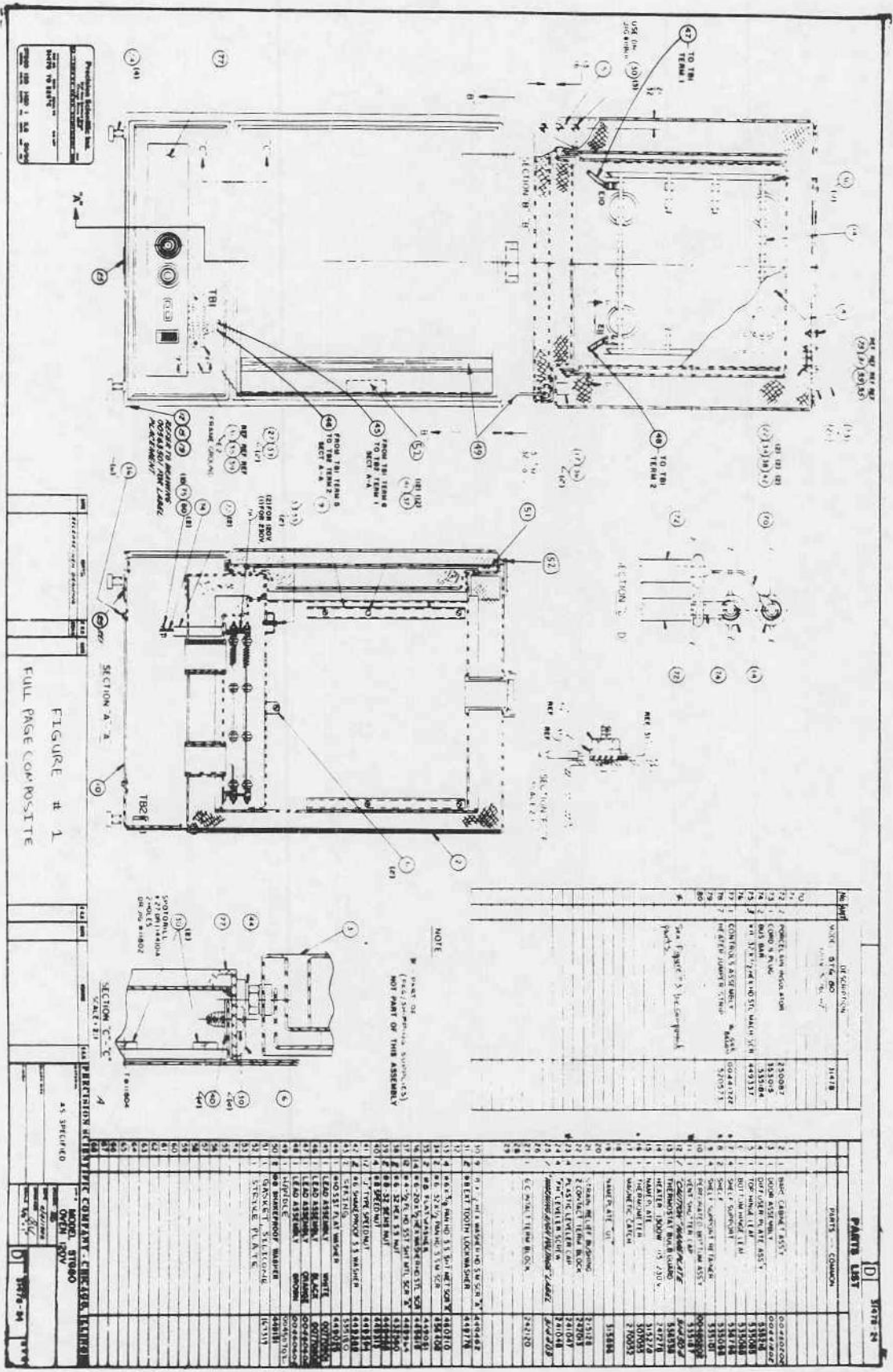
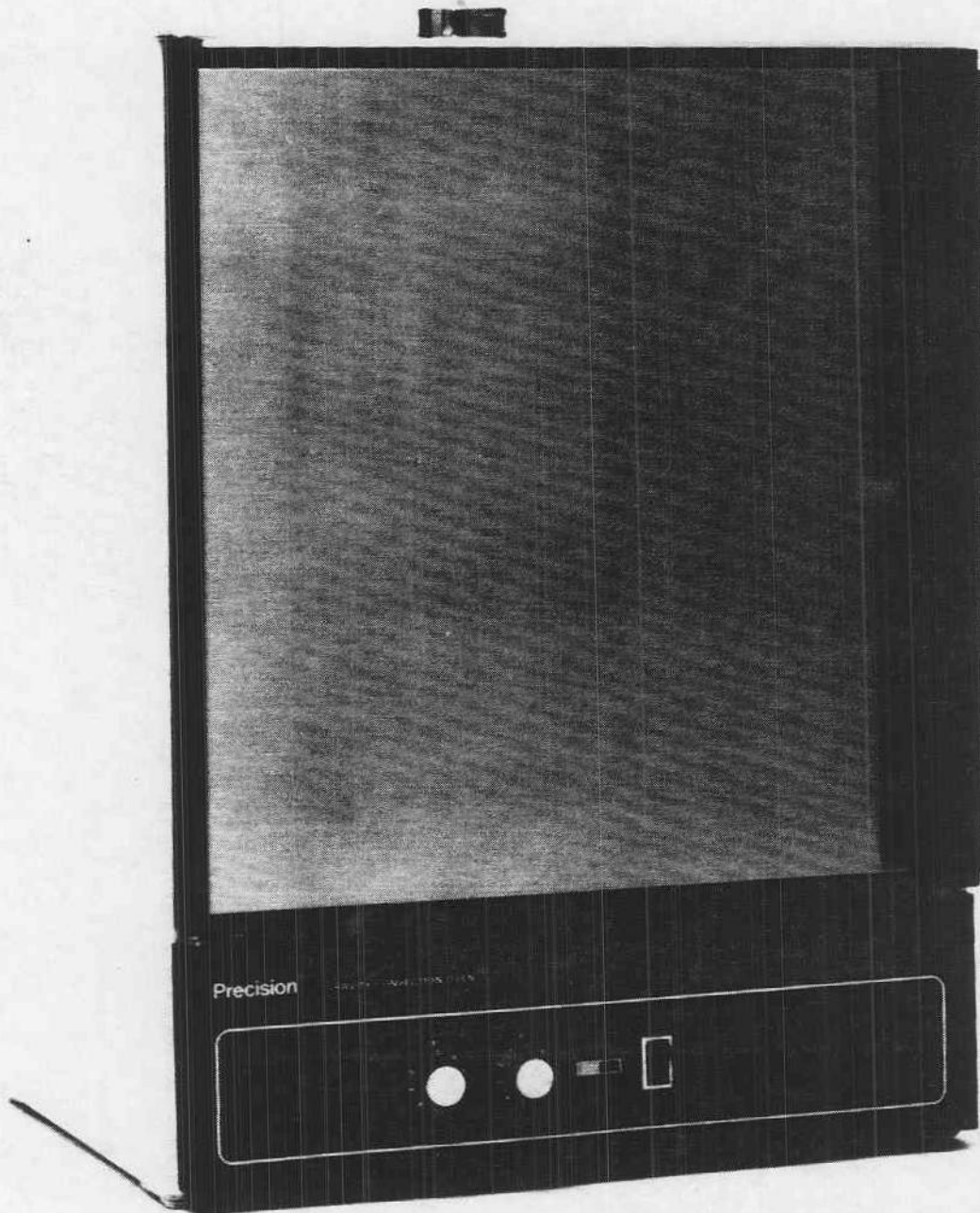




Figure #2  
Complete Oven



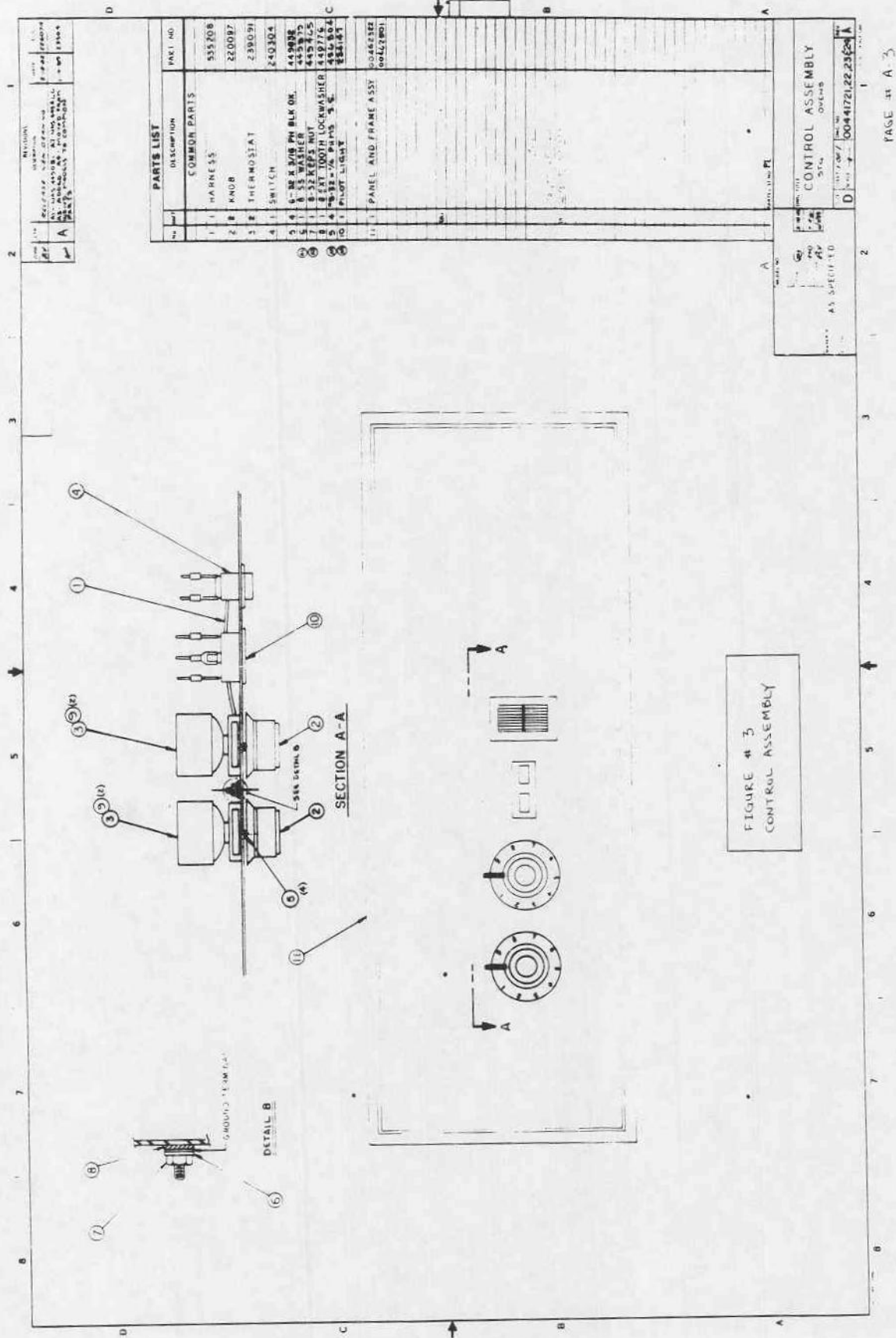


FIGURE # 3  
CONTROL ASSEMBLY

PARTS LIST	
QTY	DESCRIPTION
1	1 HARNESS
2	2 KNOB
3	3 THERMOSTAT
4	4 SWITCH
5	5 1/2" X 1/2" X 1/2" BLK ON
6	6 1/2" X 1/2" X 1/2" BLK ON
7	7 1/2" X 1/2" X 1/2" BLK ON
8	8 1/2" X 1/2" X 1/2" BLK ON
9	9 1/2" X 1/2" X 1/2" BLK ON
10	10 1/2" X 1/2" X 1/2" BLK ON
11	11 PANEL AND FRAME ASSY

CONTROL ASSEMBLY	
QTY	DESCRIPTION
1	1 CONTROL ASSEMBLY
2	2 CONTROL ASSEMBLY
3	3 CONTROL ASSEMBLY
4	4 CONTROL ASSEMBLY
5	5 CONTROL ASSEMBLY
6	6 CONTROL ASSEMBLY
7	7 CONTROL ASSEMBLY
8	8 CONTROL ASSEMBLY
9	9 CONTROL ASSEMBLY
10	10 CONTROL ASSEMBLY
11	11 CONTROL ASSEMBLY

Figure # 4  
Control Assemblies

Terminal Block, # 242120

Pilot Light, # 234147

Thermostat, # 239091

Switch, # 240304

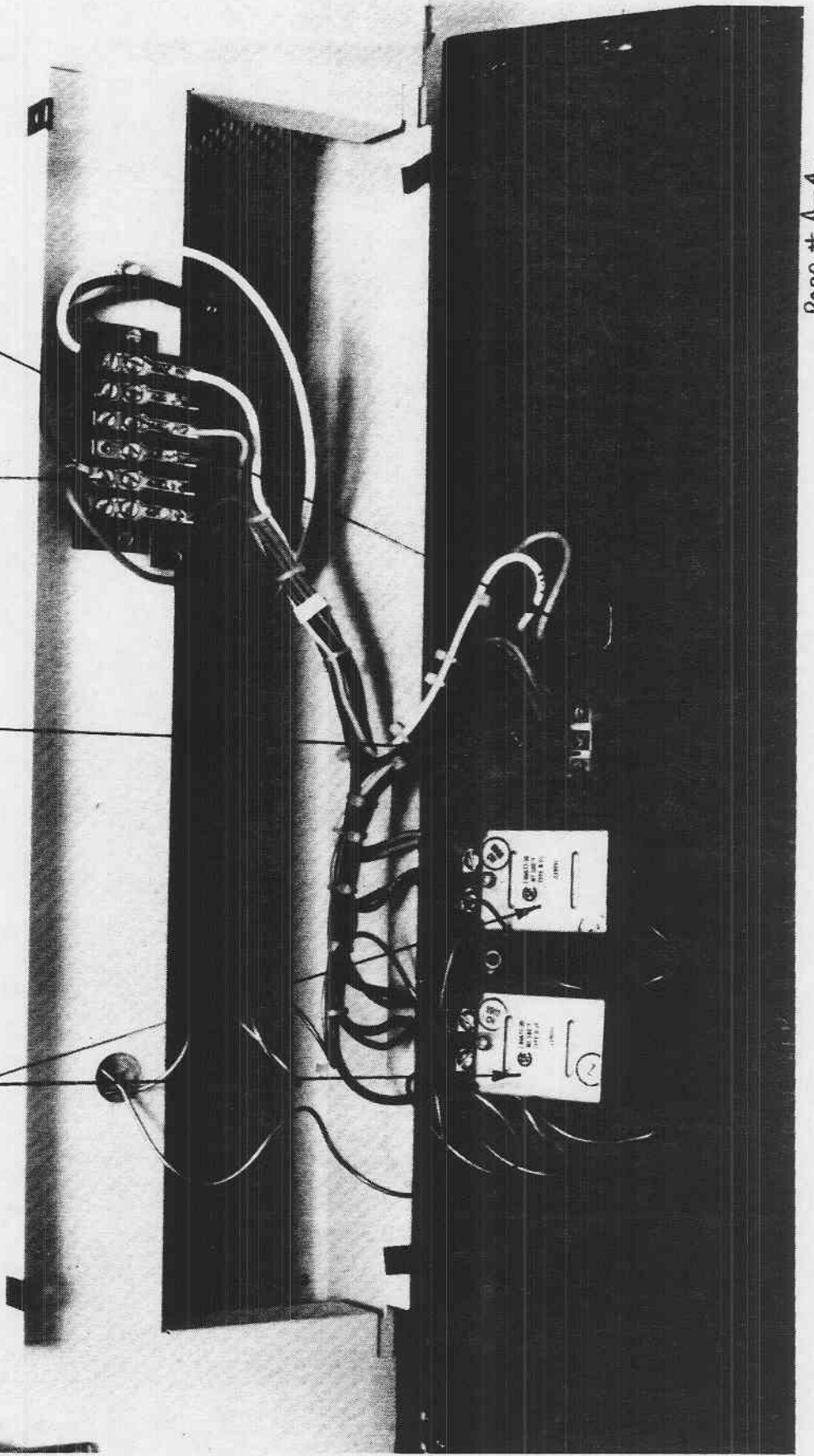






Figure #6  
Oven Interior

